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**ASSIGNMENT BOOKLET**

SCN3260 Physics 30

Module 1 Assignment

**FOR STUDENT USE ONLY**

Date Assignment Submitted:

\_\_\_\_\_

Time Spent on Assignment:

\_\_\_\_\_

(If label is missing or incorrect)

Student File Number:

\_\_\_\_\_

Module Number: \_\_\_\_\_

**FOR OFFICE USE ONLY**

Assigned

Teacher: \_\_\_\_\_

Assignment

Grading: \_\_\_\_\_

Graded by: \_\_\_\_\_

Date Assignment Received: \_\_\_\_\_

**Student's Questions  
and Comments**

Apply Module Label Here

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Please verify that preprinted label is for  
correct course and module.

**Teacher's Comments**

\_\_\_\_\_  
Teacher

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- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

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# Physics 30

Learn  veryWare

**we** explore



Momentum and Impulse

## Module 1

Assignment Booklet



EDMONTON PUBLIC SCHOOLS



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## FOR TEACHER'S USE ONLY

### Summary

	Total Possible Marks	Your Mark
Lesson 1 Assignment	22	
Lesson 2 Assignment	21	

### Teacher's Comments

Physics 30  
Module 1: Momentum and Impulse  
Assignment Booklet  
ISBN 978-0-7741-3199-5

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This document is intended for	
Students	✓
Teachers	✓
Administrators	
Home Instructors	
General Public	
Other	



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- Alberta Education, <http://www.education.gov.ab.ca>
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- Tools4Teachers, <http://www.tools4teachers.ca>

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**MODULE 1: LESSON 1 ASSIGNMENT**

This Module 1: Lesson 1 Assignment is worth 22 marks. The value of each assignment and each question is stated in the left margin.

**(22 Marks) Lesson 1 Assignment: Momentum and Newton's Second Law**

**(4 marks) A 1.** Use reasoning to determine if one of the following objects in each of these pairs has a greater value for the magnitude of its momentum than the other. (No calculations should be required.)

- a. a 900.0-kg truck travelling at 60 km/h, or a 500.0-kg car travelling at 60 km/h

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- b. a 15.0-kg object travelling to the right at 5.0 m/s, or a 15.0-kg object travelling to the left at 5.0 m/s

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- c. a 900-kg truck at rest, or a 500-kg car at rest

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- d. a 900-kg truck at rest, or a mosquito flying at 2 m/s

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**(3 marks) A 2.** Solve question 9 on page 453 of your textbook.

**(3 marks) A 3.** Solve question 12 on page 453 of your textbook.



(3 marks) **A 4.** Solve question 15 on page 453 of your textbook.

(4 marks) Select one of the following discussion questions for submission.

- D 1.** A large freight train moving down the tracks takes a long time to stop.  
**or**  
**D 2.** A motorcycle can have the same momentum as a large truck.  
**or**  
**D 3.** In general, a motorcycle can accelerate at a greater rate than a large truck.

There is more room for your response on the next page.

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**(5 marks) Reflect on the Big Picture**

In real life, a police officer may warn that “speed kills.” In video games, high-speed crashes are common. Suppose a particular scene in a game requires the following elements:

- A high-performance motorcycle must crash into a barrier and be stopped.
- A small scooter must crash into another section of the same barrier and be stopped.
- The forces exerted as each vehicle collides with the barrier change the shape of that section of the barrier in addition to stopping the vehicle.

The time required to stop each vehicle must be realistic.

Create a paragraph, illustration, animation, or audio recording to explain how you could use the concepts of momentum and net force to make each simulated crash realistic. In general, how could you use momentum and Newton's laws of motion to predict the amount that each section of the barrier changes shape?

Discuss with your teacher the options for submitting this assignment.



## MODULE 1: LESSON 2 ASSIGNMENT

This Module 1: Lesson 2 Assignment is worth 21 marks. The value of each assignment and each question is stated in the left margin.

(21 marks) **Lesson 2 Assignment: Impulse: Changing Momentum**

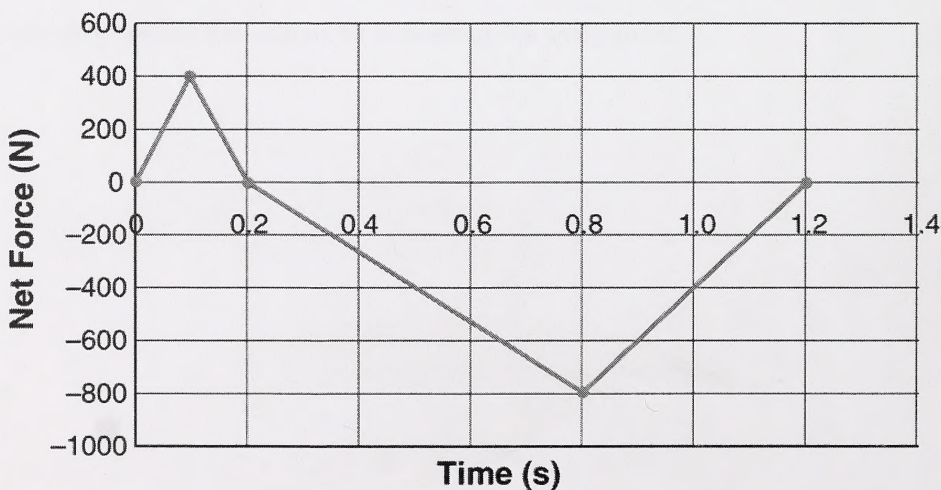
- (3 marks) **A 1.** An arrow gains a momentum of  $94.3 \text{ kg}\cdot\text{m/s}$  [W] in  $0.400 \text{ s}$ . Determine the magnitude and direction of the average unbalanced force that acted on the arrow.



- (3 marks) **A 2.** An artillery shell is accelerated from rest and gains a momentum of  $2.00 \times 10^3$  kg·m/s [E]. If the average net force acting on the shell was  $8.50 \times 10^3$  N [E], then calculate the time interval that this net force acted on the shell.

- A 3.** A high school football player hits and pushes a tackling dummy during practice. The following graph shows the amount of force that acts on the player.

**Net Force vs Time for a Football Player**





**(1 mark)**

- a. What happens to the player's forward velocity during the first 0.20 s?
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**(1 mark)**

- b. What happens to the player's velocity from 0.20 to 1.20 s?
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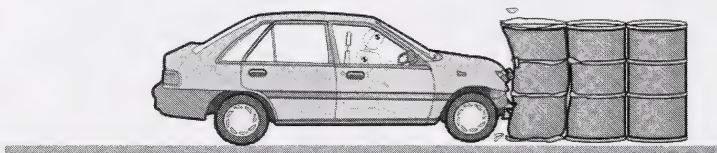
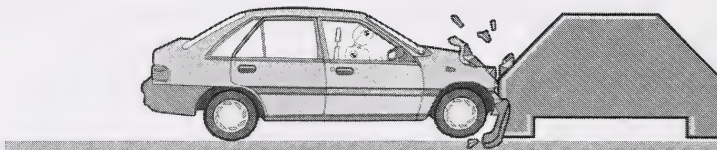
**(3 marks)**

- c. What is the impulse that acts on the football player?

**(3 marks)**

- d. If the 60-kg player is running forward at 7.0 m/s when she makes contact with the dummy, what is the player's velocity at the end of the 1.20-s impact?

- (3 marks) A 4. The following illustration shows two ways of providing impulse to change the momentum of a vehicle. In the top illustration, the vehicle collides with a massive concrete barrier. In the bottom illustration, the vehicle collides with water-filled barrels.



Explain which type of crash barrier would likely produce less damage to the vehicle and less injury to the occupants.

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**(4 marks) Discuss**

Post your findings to the discussion area, and compare your findings with those of other students. How do their findings differ from yours? Are the arguments made to support these views consistent with the information you researched? Did other students find additional information unknown to you? Has your opinion of bicycle helmets changed since you started? Explain.

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page or a sheet of stationery.







